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| 10/689,635 | 10/22/2003 | Howard E. Rhodes | M4065.0946/P946 | 4044 |

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| LUU, THANH X | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2878 | |

DATE MAILED: 11/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/689,635 | RHODES, HOWARD E. | |
| | Examiner | Art Unit | |
| | Thanh X. Luu | 2878 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *11 October 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-72* is/are pending in the application.

4a) Of the above claim(s) *64-72* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-63* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 November 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *12/2004; 10/2003*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Election/Restrictions*

1. Applicant's election without traverse of claims 1-63 in the reply filed on October 11, 2005 is acknowledged.

Claims 64-72 are withdrawn.

### *Information Disclosure Statement*

2. The information disclosure statement filed December 7, 2004 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each cited foreign patent document; each non-patent literature publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. It has been placed in the application file, but the information referred to therein has not been considered.

### *Specification*

3. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

### *Claim Rejections - 35 USC § 112*

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 11, 22, 35, 57 and 58 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 11, 35, 57, 58, "the substrate" lacks proper antecedent basis. Further, it is unclear how a substrate is related to the rest of the invention.

Regarding claim 22, it is unclear in its given context how a first region is opposite to itself.

***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 1, 3, 7, 16, 17, 19, 25-27, 40, 43, 48-50 and 63 are rejected under 35 U.S.C. 102(e) as being anticipated by Loose (U.S. Patent 6,759,641).

Regarding claims 1, 3, 7, 16, 17, 19, 25-27, 40, 43, 48-50 and 63, Loose discloses (see Fig. 2a) a pixel cell (30) and method, comprising: a first photo-conversion device (PD2) that generates charge; a second photo-conversion device (PD1) that generates charge; and readout circuitry (see Fig. 2a) that provides first readout signals indicating charge generated by the first device and a second readout signals indicating charge generated by the second device. The photodiode of Loose is a photoconductor. Loose further discloses (see Fig. 2a) a gate of an output source follower transistor (Q2) is connected to the second photo-conversion device and an array of pixel cells as claimed. Loose also discloses (see Figs. 2a and 6) a first gate structure (gate of Q3) that controls an output signal; a first region (86) of a substrate that is doped to generate

a charge in response to light, the first region being electrically connected to the first gate structure; a second region (88) of the substrate that is doped to generate a charge in response to light; a second gate structure (78) that controls charge transfer between the first and second regions.

8. Claims 1, 3, 7-12, 16, 17, 19-22, 25-27, 32-36, 40, 43, 48-50, 55-59, 62 and 63 are rejected under 35 U.S.C. 102(e) as being anticipated by Kochi (U.S. Patent 6,947,088).

Regarding claims 1, 3, 7-12, 16, 17, 19-22, 25-27, 32-36, 40, 43, 48-50, 55-59, 62 and 63, Kochi discloses (see Fig. 2) a pixel cell and method, comprising: a first photo-conversion device (205-1) that generates charge; a second photo-conversion device (205-2) that generates charge; and readout circuitry (see 2-4) that provides first readout signals indicating charge generated by the first device and a second readout signals indicating charge generated by the second device. The photoelectric conversion device of Kochi is a photoconductor. Kochi also discloses (see Fig. 2) a transistor having a gate (203-1) adjacent to the first photo-conversion device and the second photo-conversion device is on the opposite side, and a doped well (201) below the gate as claimed. Kochi further discloses (see Fig. 2) a gate of an output source follower transistor (2) is connected to the second photo-conversion device and an array of pixel cells (see Fig. 1) as claimed. Kochi also discloses (see Fig. 2) a first gate structure (gate of 2) that controls an output signal; a first region (205-1) of a substrate that is doped to generate a charge in response to light, the first region being electrically connected to the first gate structure; a second region (205-2) of the substrate that is

doped to generate a charge in response to light; a second gate structure (203-1) that controls charge transfer between the first and second regions.

9. Claims 1-3, 5, 7-12, 16, 17-28, 30, 32-36, 40, 42, 43, 48-53, 55-59, 62 and 63 are rejected under 35 U.S.C. 102(b) as being anticipated by Takahashi (U.S. Patent 5,955,753).

Regarding claims 1-3, 5, 7-12, 16, 17-28, 30, 32-36, 40, 42, 43, 48-53, 55-59, 62 and 63, Takahashi discloses (see Fig. 10) a pixel cell and method, comprising: a first photo-conversion device (25) that generates charge; a second photo-conversion device (FD and the second photo-conversion region, not labeled) that generates charge; and readout circuitry (see surrounding circuitry) that provides first readout signals indicating charge generated by the first device and a second readout signals indicating charge generated by the second device. The photoelectric conversion device of Takahashi is a pinned photodiode or a photoconductor. Takahashi also discloses (see Fig. 10) a transistor having a gate (TXo) adjacent to the first photo-conversion device and the second photo-conversion device is on the opposite side, and a doped well (p-type well) below the gate as claimed. Takahashi further discloses (see Fig. 10) a gate of an output source follower transistor (not labeled) is connected to the second photo-conversion device and an array of pixel cells (see Fig. 1) as claimed. Takahashi also discloses (see Fig. 10) a first gate structure (a gate of one of the unlabeled transistors) that controls an output signal; a first region (25) of a substrate that is doped to generate a charge in response to light, the first region being electrically connected to the first gate structure; a second region (FD and second photo-conversion region, not labeled) of the

substrate that is doped to generate a charge in response to light; a second gate structure (at TXo) that controls charge transfer between the first and second regions. In addition, Takahashi discloses (see Fig. 10) the second pinned photodiode (FD and second photo-conversion area, not labeled) receiving charge transferred from the first pinned photodiode (25) and a second gate (at TXe); and CDS (see col. 5, lines 10-15) as claimed.

10. Claims 1, 3, 4, 7-9, 16, 17, 19, 20, 22, 25-27, 29, 32, 33, 40, 43, 48-50, 52, 55, 56 and 63 are rejected under 35 U.S.C. 102(b) as being anticipated by Barna et al. (WO 00-78034).

Regarding claims 1, 3, 4, 7-9, 16, 17, 19, 20, 22, 25-27, 29, 32, 33, 40, 43, 48-50, 52, 55, 56 and 63, Barna et al. disclose (see Fig. 2) a pixel cell and method, comprising: a first photo-conversion device (photogate PG) that generates charge; a second photo-conversion device (FD 152) that generates charge; and readout circuitry (see surrounding circuitry) that provides first readout signals indicating charge generated by the first device and a second readout signals indicating charge generated by the second device. Barna et al. also disclose (see Fig. 2) a transistor having a gate (154) adjacent to the first photo-conversion device and the second photo-conversion device is on the opposite side. Barna et al. further disclose (see Fig. 2) a gate of an output source follower transistor (158) is connected to the second photo-conversion device and an array of pixel cells (see Fig. 1) as claimed. Barna et al. also disclose (see Fig. 2) a first gate structure (gate of 160) that controls an output signal; a first region (PG) of a substrate that is doped to generate a charge in response to light, the first region being

electrically connected to the first gate structure; a second region (FD 152) of the substrate that is doped to generate a charge in response to light; a second gate structure (154) that controls charge transfer between the first and second regions.

11. Claims 25, 41, 44 and 46 are rejected under 35 U.S.C. 102(b) as being anticipated by Suzuki (U.S. Patent 4,819,074).

Regarding claims 25, 41, 44 and 46, Suzuki discloses (see Fig. 2) an array of pixel cells, comprising: a substrate (inherent; see also Fig. 6); an array of pixel cells (at 11), each cell comprising: a first photo-conversion device (11) that generates charge; a second photo-conversion device (associated portion of 12) that generates charge; and readout circuitry (see Fig. 2) that provides first readout signals indicating charge generated by the first photo-conversion device and second readout signals indicating charge generated by the second photo-conversion device; and control circuitry (see Fig. 3) that applies a criterion (8e) to readout signals from the second photo-conversion devices until the criterion is met, and when the criterion is met, causes the readout circuitry to provide signals indicating charge generated by the first photo-conversion devices. Suzuki further discloses (see Fig. 1) a processor (4).

***Claim Rejections - 35 USC § 103***

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

13. Claims 6, 31 and 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi.

Regarding claims 6, 31 and 54, Takahashi discloses the claimed invention as set forth above. Takahashi does not specifically disclose the pinning voltage relationship as claimed. However, choosing a particular pinning voltage is a matter of design choice and requires only routine skill in the art. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide a higher pinning voltage on one pinned photodiode to obtain a desired sensitivity for improved detection.

14. Claims 13-15, 37-39, 60 and 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over either one of Kochi or Takahashi.

Regarding claims 13-15, 37-39, 60 and 61, Kochi and Takahashi disclose the claimed invention as set forth above. Kochi and Takahashi do not specifically disclose doped well configuration as claimed. However, there are a variety of different configurations for photo-conversion devices in and out of doped wells that are well known in the art. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide the claimed doped well configuration to obtain a desired sensitivity or response for detection.

15. Claims 45 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki.

Regarding claims 45 and 47, Suzuki discloses the claimed invention as set forth above. Suzuki does not specifically disclose a CDS circuit as claimed. However, CDS is notoriously well known in the art. It would have been obvious to a person of ordinary

skill in the art at the time the invention was made to provide CDS in the apparatus of Suzuki to reduce noise and improve detection as known.

***Conclusion***

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanh X. Luu whose telephone number is 571-272-2441. The examiner can normally be reached on M-F 6:30AM-4:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dave Porta can be reached on 571-272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Thanh X Luu
Primary Examiner
Art Unit 2878

10/2005